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IDENTIFIERS *Principles of Technology; *Tech Prep

ABSTRACT

This document is a series of transparency masters divided into four sections on three types of transformation programs: technical literacy training, retraining for technology, and tech prep programs. The first section includes the following: transformations development; retraining workers for technology; elements of transformations program; Lorain County (Ohio) Community College's transformations curriculum; applied mathematics units for year one and two; 14 units that form the foundation for principles of technology (PT); comparison of PT and physics test results; applied math scores from Greene County (North Carolina); workshop agenda for "Developing the Outstanding Worker"; and a newspaper advertisement. Section 2, transformations for employed workers, outlines transformations at Boise State University (Idaho) and a semiconductor manufacturing technology curriculum. Section 3, transformations as a tech prep bridge program, includes the following: what is required to teach advanced skills in tech prep/associate degree programs; how does a bridge program fit into a tech prep curriculum; and transformations--the bridge program for adults entering advanced skills training. Section 4 lists the following implementation considerations: essential elements of the transformations program; student selection; quality of training; avoidance of labor market oversaturation; cost estimate; student support services; program staff; job search assistance activities; and sequencing curriculum offerings. (NLA)

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TRANSFORMATIONS

TECHNICAL LITERACY TRAINING
RETRAINING FOR TECHNOLOGY
TECH PREP BRIDGE PROGRAM

Presentation at

American Vocational Association
Los Angeles, California

December 1991

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By

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TRANSFORMATIONS DEVELOPMENT

- Curriculum designed, tested in Copperhill (TN) project 1987-88
  - Curriculum built around Principles of Technology
  - Taught "on site" before layoffs

- Model demonstration site at Lorain County Community College
  - USED grant 1/89-6/90
  - Cooperative from JVS, PIC, local minority organizations
  - Four Classes of approximately 25 students
  - Modified Curriculum
  - Full-time schedule for 18-week program
  - Low dropout rate/high placement
  - Fourth class began 1/22/90

- Replication of model
  - JTPA Funded programs
    - Lorain, Ohio
    - Saginaw, Michigan
    - Waco, Texas
  - Training for employed workers
    - Lorain, Ohio (Ford, AT&T)
    - Boise, Idaho (Micron, Inc., Zilog, Inc.)
    - Topeka, Kansas (KAW Area Technical School)
  - Preparation for Associate Degree entry
    - Waco, Texas
    - Topeka Kansas

- Materials development
  - Graphics
  - Personal computers
  - Mechanical Devices and Systems
  - Quality Control
  - Applied Academics - Addition of Applied Biology/Chemistry
  - Cleanroom procedures
  - Vacuum systems

- Transformations as a Tech Prep bridge program

- Transformations Consortium

RETRAINING WORKERS FOR TECHNOLOGY
(Pilot Program)

TARGET AUDIENCE

- Displaced workers had exhausted their unemployment compensation benefits
- Workers at risk of layoff or dislocation due to anticipated business/plant downsizing
- Workers who were significantly underemployed
- Displaced workers who desired to enter the technical workforce

BACKGROUND

- Reading ability no lower than eight-grade level; required to pass Nelson-Denny Reading Test, Forms C and D at a satisfactory level
- Mathematics ability that includes a facility with common arithmetic operations; required to pass Tests of Basic Education (TABE) at a satisfactory level
- Interest in understanding how and why technical devices and systems operate

CHARACTERISTICS OF A TYPICAL CLASS

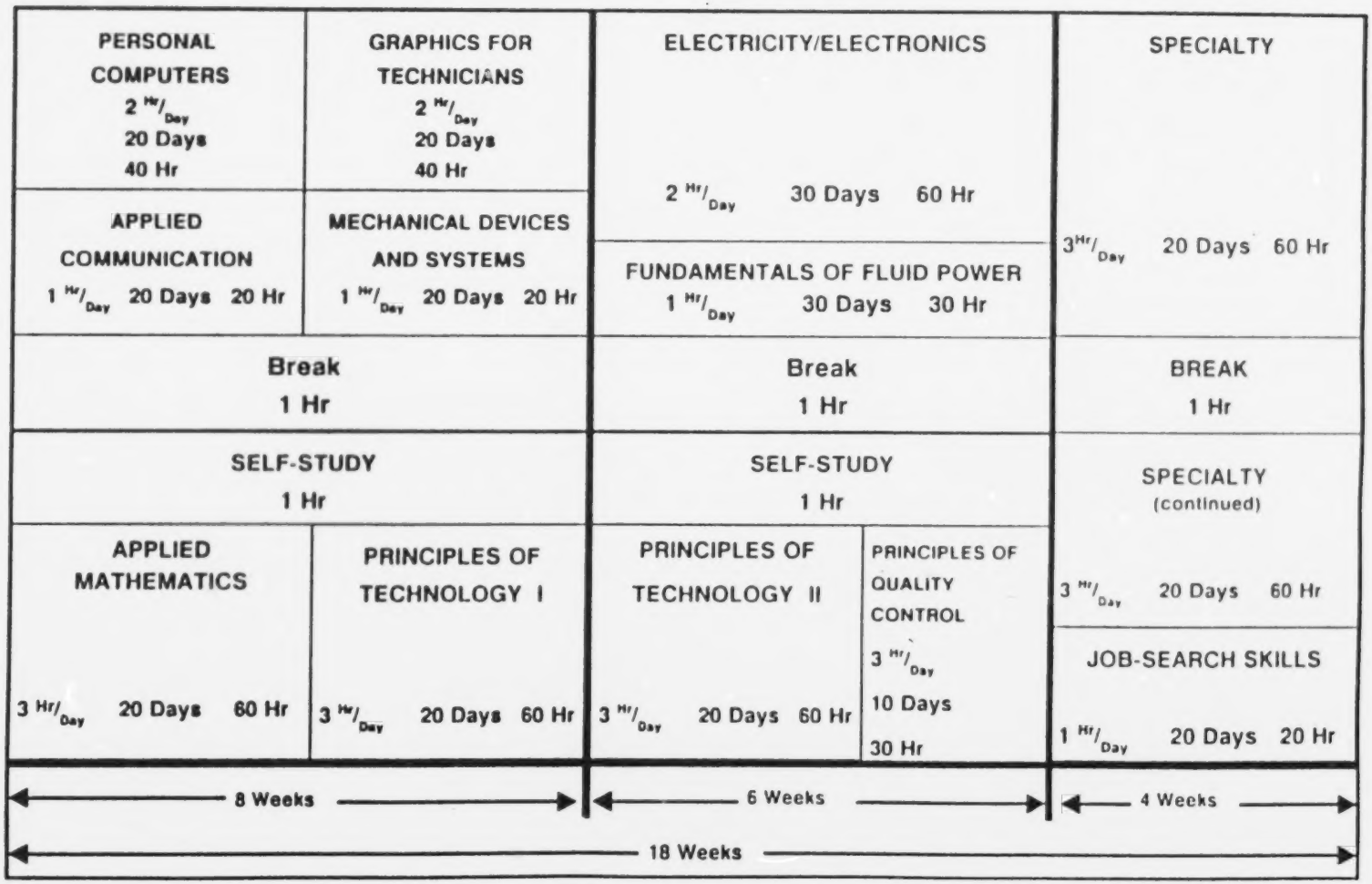
- Ranged in age from early 20s to early 60s; 50% were in the 30-39 year range
- Male-female split was 80-20
- One-third came from traditionally under-represented groups
- The few who had not completed high school completed GED requirements
- A few had an associate or 4-year degree
- Many had participated previously in employer-sponsored training programs

Elements of Transformations Program

- Local Advisory Committee
- Assessment of Students
  - Testing
  - Remediation if Needed
  - ESL if Needed
- Training Program
  - Applied Academics (Communications, Math, Principles of Technology)
  - Computer Literacy
  - Graphics
  - Mechanical Principles
  - Electrical Principles
  - Fluid Principles (or) Chemistry
  - Quality Control
  - Technical Specialty
- Attention to Learning Styles and Methodology
  - Group Learning
  - Interpersonal Skills
  - Team Processes
  - Reduced Competition
  - Focus Groups
  - Positive Reinforcement
- Ongoing Counseling
- Personal Support
- Tutoring
- Placement Assistance
  - Job Search Skills
  - Resume Writing

LORAIN COUNTY COMMUNITY COLLEGE

Transformations—Training for Technology Curriculum



J107 12/20/89

APPLIED MATHEMATICS - YEAR ONE

PREPARATORY UNITS

✱A	Getting to Know Your Calculator	REVISITING FRACTIONS, DECIMALS, PERCENTS WITH THE HELP OF A CALCULATOR
✱B	Naming Numbers in Different Ways	
✱C	Finding Answers with Your Calculator	

APPLIED MATH UNITS

✱1	Learning Problem-solving Techniques	BASIC MATH SKILLS THAT EVERYONE NEEDS
✱2	Estimating Answers	
✱3	Measuring in English and Metric Units	
✱4	Using Graphs, Charts and Tables	
✱5	Dealing with Data	
✱6	Working with Lines and Angles	GEOMETRY
✱7	Working with Shapes in Two Dimensions	
✱8	Working with Shapes in Three Dimensions	
✱9	Using Ratios and Proportions	BASIC SKILLS IN ALGEBRA
✱10	Working with Scale Drawings	
11	Using Signed Numbers and Vectors	
12	Using Scientific Notation	
✱13	Precision, Accuracy, and Tolerance	
14	Solving Problems with Powers and Roots	
15	Using Formulas to Solve Problems	

✱ Used in Transformations program

Applied Mathematics

APPLIED MATHEMATICS - YEAR TWO

16	Solving Problems That Involve Linear Equations	BASIC SKILLS IN ALGEBRA
17	Graphing Data	
18	Solving Problems That Involve Nonlinear Equations	
19	Working with Statistics	QUALITY CONTROL
20	Working with Probabilities	
21	Using Right-triangle Relationships	INTRO TO TRIGONOMETRY
22	Using Trigonometric Functions	
23	Factoring	HIGHER SKILLS IN ALGEBRA
24	Patterns and Functions	
25	Quadratics	
26	System of Equations	
27	Inequalities	
28	Geometry in the Workplace 1	APPLICATIONS OF GEOMETRY IN THE WORLD OF WORK
29	Geometry in the Workplace 2	
30	Solving Problems with Computer Spreadsheets	USING COMPUTERS TO SOLVE PROBLEMS
31	Solving Problems with Computer Graphics	
32	Quality Assurance and Process Control I	PRACTICE AND APPLICATIONS OF QA/QC IN THE WORKPLACE
33	Quality Assurance and Process Control II	

PRINCIPLES OF TECHNOLOGY

FOURTEEN UNITS THAT FORM THE FOUNDATION FOR PRINCIPLES OF TECHNOLOGY

★FORCE	MOMENTUM
★WORK	★ WAVES
★RATE	★ ENERGY CONVERTORS
★RESISTANCE	★ TRANSDUCERS
★ENERGY	RADIATION
★POWER	OPTICAL SYSTEMS
★FORCE TRANSFORMERS	TIME CONSTANTS

★ Used in Transformations program

HOW IS PT MEASURING UP?

(PT VERSUS PHYSICS – TEST RESULTS FROM IOWA*)

POPULATION: 16 SITES – EACH SITE HAD A CONTROL GROUP, A PT CLASS, AND A PHYSICS CLASS

TEST: 120 QUESTIONS BASED ON UNITS 1–6 OF PT—*FORCE, WORK, RATE, RESISTANCE, ENERGY, AND POWER*

TEACHERS: ONE PT CLASS TAUGHT BY SCIENCE TEACHER; OTHER FIFTEEN TAUGHT BY INDUSTRIAL ARTS TEACHERS

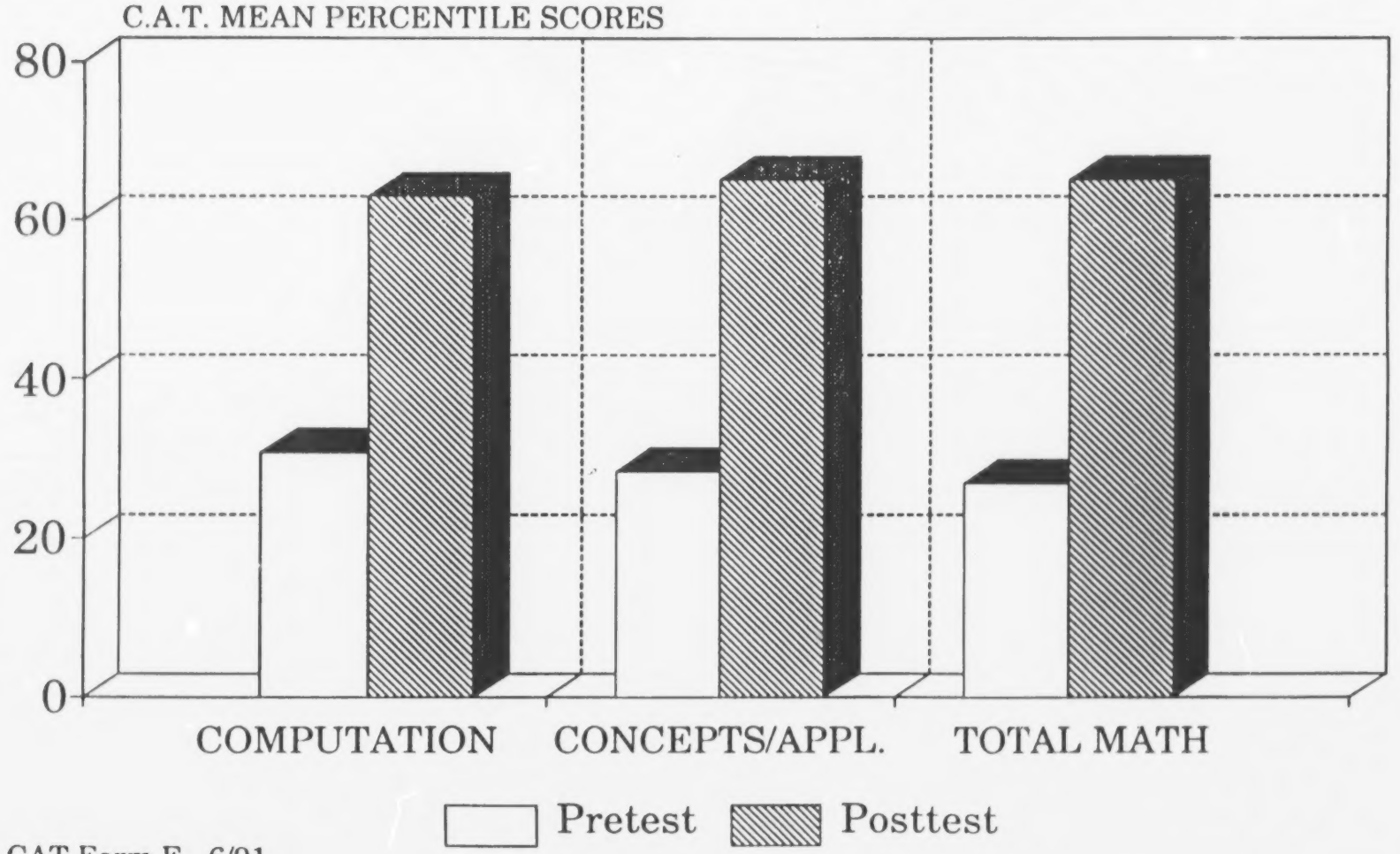
RESULTS:

	PRETEST MEAN	POST-TEST MEAN	CHANGE
PHYSICS CLASSES (275 STUDENTS)	55.07	65.77	+ 10.7
PT CLASSES (257 STUDENTS)	47.80	80.14	+ 32.34
CONTROL GROUP (135 STUDENTS)	37.78	36.45	– 1.33

* Dr. John Dugger, 515/294-1033
Associate Professor of Industrial Technology
Iowa State University
Ames, Iowa 50011

APPLIED MATH I, 1991

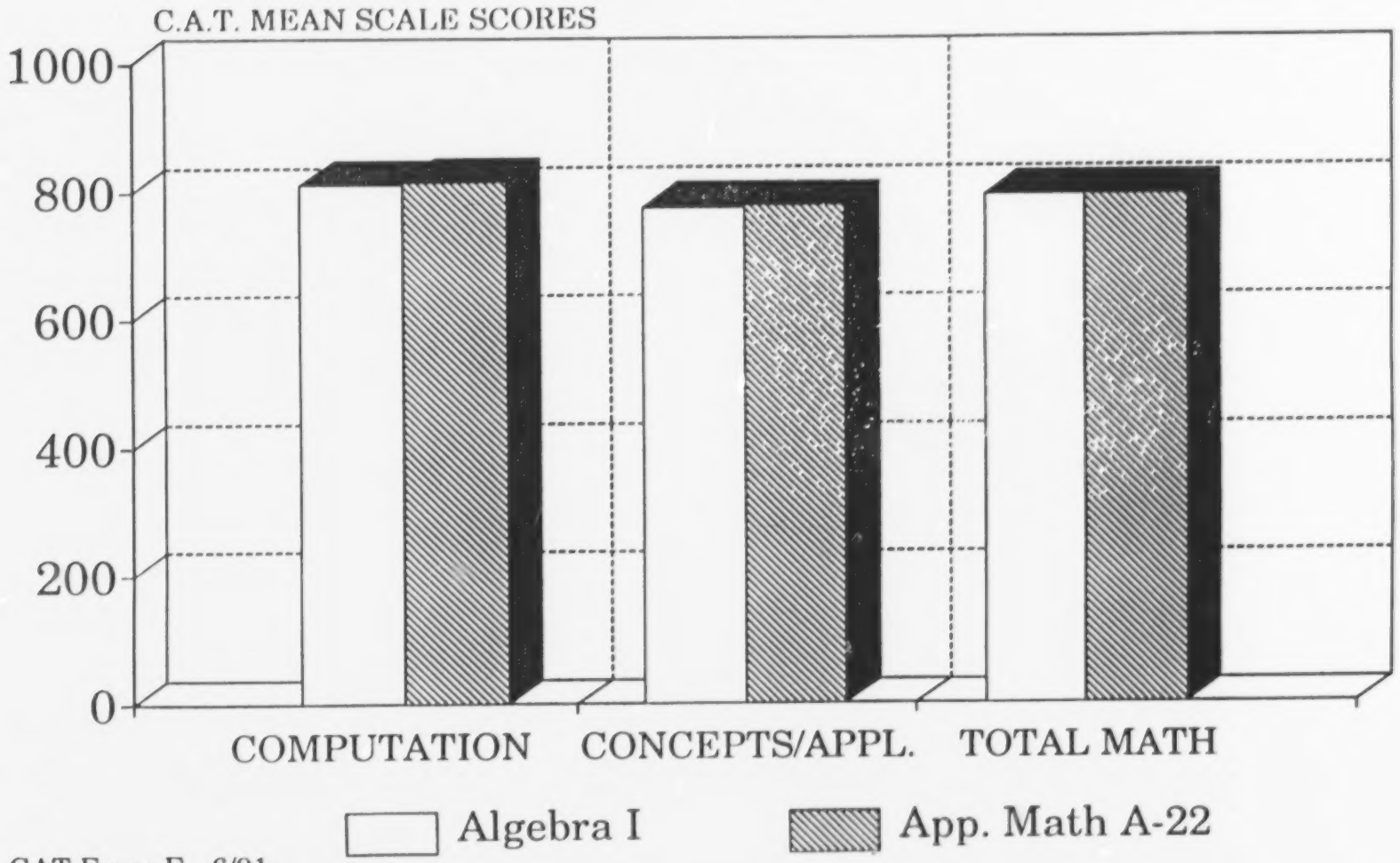
GREENE COUNTY SCHOOLS, NORTH CAROLINA



CAT Form E, 6/91

APPLIED MATH UNITS A-22, 1991

GREENE COUNTY SCHOOLS, NORTH CAROLINA



CAT Form E, 6/91

TEXAS A&M UNIVERSITY

COLLEGE STATION, TX 77843-0100

Office of
ADMISSIONS AND RECORDS
(409) 845-1031

November 16, 1990

Jim Winn
1614 Chambers Street
Bastrop, TX 78602

Dear Mr. Winn,

This letter is in response to your inquiry back in September concerning the acceptability of *Principles of Technology* as a lab science credit toward admission to Texas A&M. I am sorry that I have taken so long to get back to you. We referred the materials to Dr. A. L. Ford, Chair of the Undergraduate Curriculum Committee for the Department of Physics. We have just received his recommendation and we will accept *Principles of Technology* for 1 credit toward our 2-credit science requirement. Dr. Ford stated that this course could in fact be a better educational experience than a more traditional course for all but the brightest students.

If you have further questions or if I may be of other assistance to you, please call on me.

Sincerely,

Gale T. Wood
Associate Director of Admissions

C203

ASSISTING IN THE LONG TERM EMPLOYMENT NEEDS OF

DOW CHEMICAL U.S.A., MICHIGAN DIVISION

AN EQUAL OPPORTUNITY EMPLOYER

ASSESSMENT, PLACEMENT, AND TRAINING

BUILDING TOMORROW'S RESOURCES TODAY

SCHOOL DISTRICT of the CITY of SAGINAW MICHIGAN

DOW

Assessment, Placement and Training

Presents:

Developing the Outstanding Worker

A Team Approach

18

Developing the Outstanding Worker

RECRUITMENT AND PRE-ASSESSMENT

Assessment of General Education Development
Assessment of Basic Aptitudes
Selection of Participants

UPGRADING THE BASICS

(as needed)

MATHEMATICS: algebra, geometry, statistics, problem solving
READING/LANGUAGE: composition, vocabulary, comprehension

PRE-EMPLOYMENT TRAINING

DEVELOP POSITIVE WORK ATTITUDES
dependability, pride in work, punctuality

IDENTIFY SKILLS
recent work skills, transferable skills

DEVELOP TEAM WORK
sharing of ideas, communication, listening

UNDERSTAND EMPLOYER EXPECTATIONS
quality of work, loyalty to company, operation philosophy

ACADEMIC/TECHNICAL TRAINING

Mathematics
Physics
Chemistry
Mechanics

JOB PREPARATION

Understand Employment Process
Complete Paperwork
Acquire Job interviewing and Communication Skills
Cultivate Dow Team Attitude

DOW PRE-EMPLOYMENT SCREENING

Review Assessments and Skill Development
Complete Dow Testing and Employment Process
Interview for Possible Hire

FOLLOW UP

(if hired)

Meet With Supervisors and New Hires
Receive Dow Employee Evaluation

FOR INFORMATION CONTACT:

School District of the City of Saginaw
Assessment, Placement, and Training
115 W. Genesee, Saginaw, MI 48602
(517) 776-0646

OR

Dow Chemical U.S.A.
Michigan Division
690 Building, Midland, Michigan 48640
(517) 636-1200

Texas State Technical Institute/Waco

If You've Been Laid Off... This Program is for You!

TSTI/Waco provides a re-training program for qualified dislocated and unemployed people. If you qualify, you will receive technical training at *NO COST TO YOU*. You can learn and train now for the jobs of tomorrow at TSTI/Waco!

"Transformations -- through Technology"

TEXAS STATE TECHNICAL INSTITUTE/WACO

TSTI

Funded by the JTPA and administered by the Heart of Texas Council of Government, our program will provide you with:

- **Job Counseling**
- **Job Placement Assistance**
- **14 Week Training Program**

TAKE ADVANTAGE OF THIS OPPORTUNITY NOW!
Orientation session begins 9:00 a.m., Monday, Nov. 26, in the Tech-Prep Building on the campus of TSTI/Waco. Walk-ins are welcome. For additional information, call (817) 867-4830 or Toll Free 1-800-792-TSTI ext. 4830.

TSTI/Waco: Our Focus is Your Future!

TRANSFORMATIONS FOR EMPLOYED WORKERS

TRANSFORMATIONS at BOISE STATE UNIVERSITY

Sponsor US Department of Education through SEMATECH

Training provider Boise State University, Boise, Idaho

Participants

19 workers employed by MICRON—a semiconductor manufacturer

Attended training 3 hours per day, 4 days a week, 26 weeks

Received from MICRON 1.5 hours paid release time 4 day a week to attend training

Contributed 1.5 hours of personal time 4 days a week for class attendance plus study time

Worked 12 hour shifts—3 days "on", 3 "off"

Most worked overtime, several were "on-call"

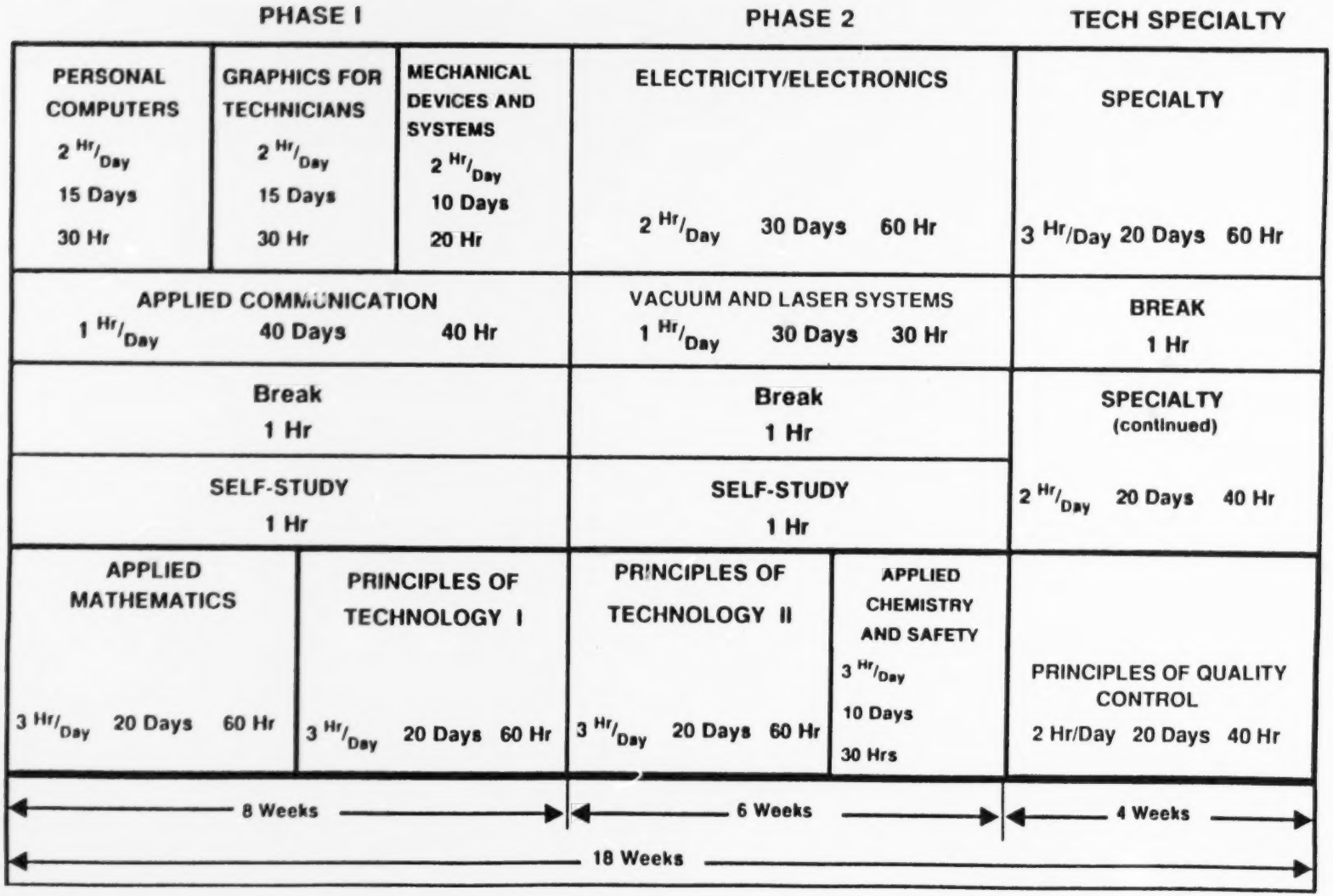
Curriculum

Adaptation of Transformations model—300 contact hours

- Applied Mathematics
- Principles of Technology
- Graphics for Technicians
- Mechanical Devices and Systems
- Fluid Power
- Keyboard skills
- Introduction to WordPerfect
- Communications

SEMICONDUCTOR MANUFACTURING TECHNOLOGY

PROPOSED RETRAINING CURRICULUM



TRANSFORMATIONS AS

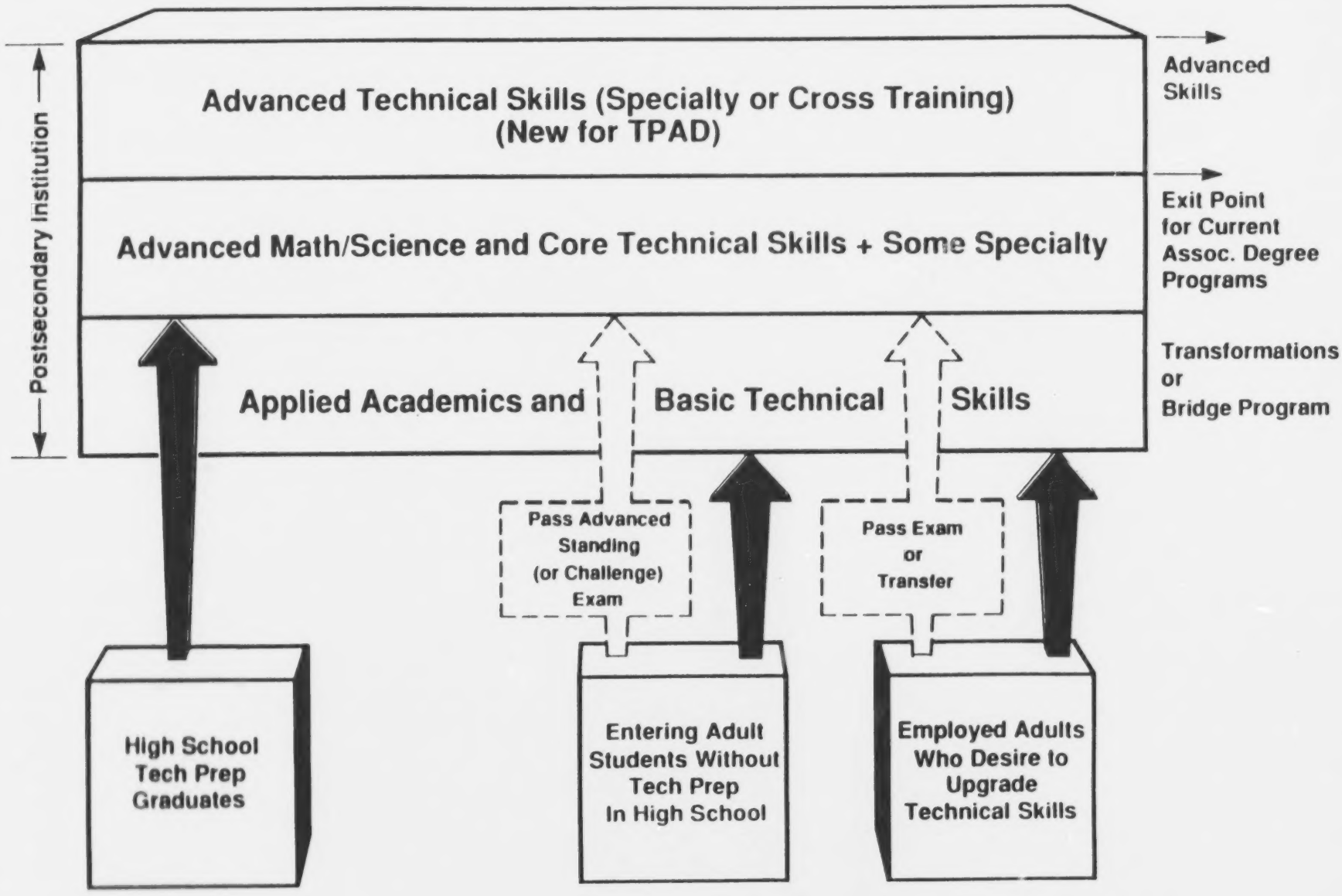
A TECH PREP BRIDGE PROGRAM

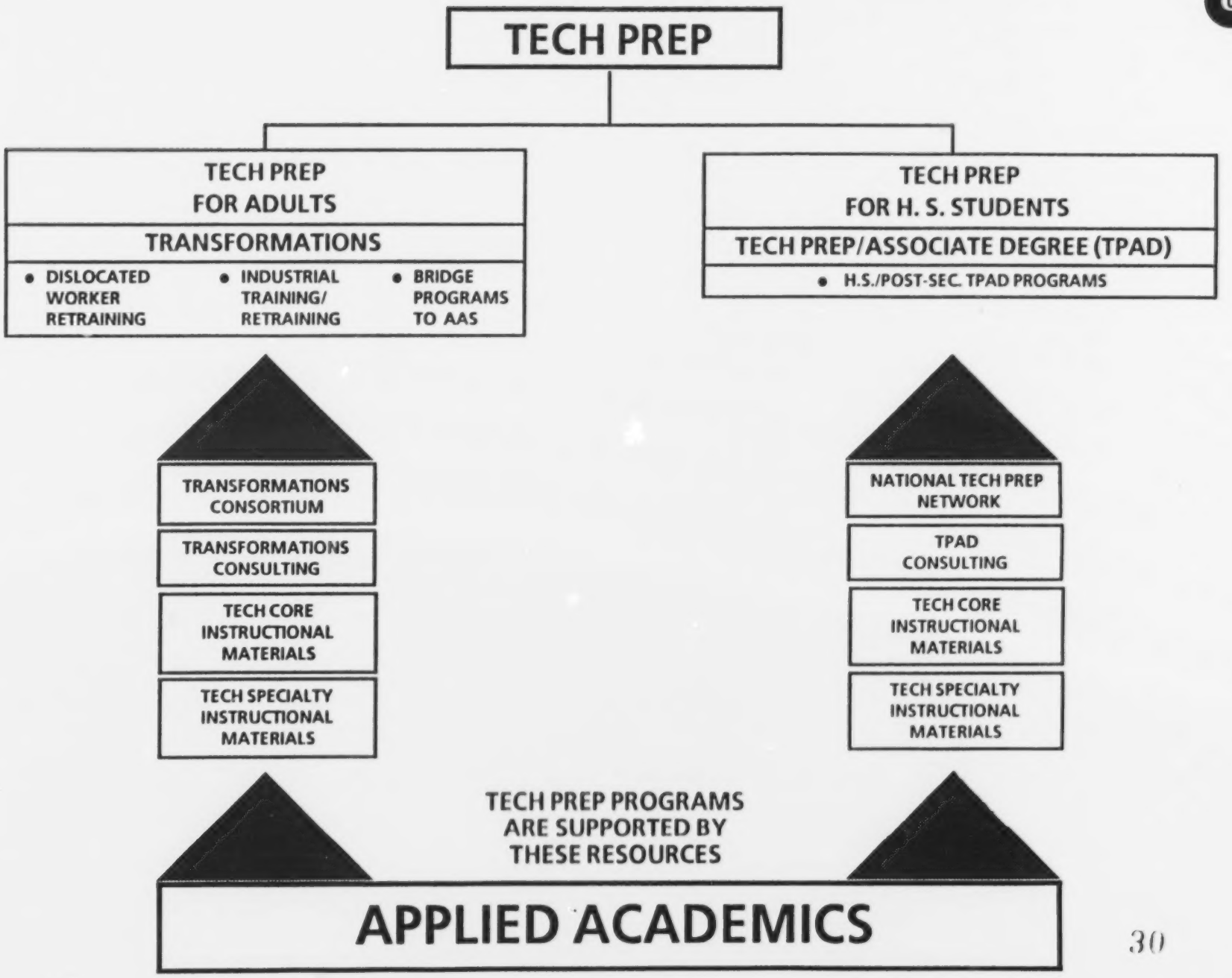
What's Required to Teach Advanced Skills in TPAD Programs?

- A postsecondary *Bridge Program* to provide entering students who have not been in Tech Prep with the same academics and basic technology that have been taught to high school Tech Prep graduates

- The bridge program, called "Transformations" or "Tech Prep for Adults," is two quarters or one semester of college work containing the essential elements of a high school Tech Prep program. In a technical field, the bridge program should contain essential content of the following:
  - Principles of Technology
  - Applied Mathematics
  - Applied Communication
  - Applied Biology/Chemistry (in some fields)
  - Graphical Communications
  - Use of Personal Computers
  - Fundamentals of Electricity/Electronics
  - Quality Control Concepts/Practices

HOW DOES A "BRIDGE PROGRAM" FIT INTO A TECH PREP CURRICULUM?


Postsecondary Institution
Advanced Technical Skills (Specialty or Cross Training)
(New for TPAD)
Advanced Math/Science and Core Technical Skills + Some Specialty
Applied Academics and
Basic Technical
Skills
Advanced Skills
Exit Point for Current Assoc. Degree Programs
Transformations or Bridge Program
Pass Advanced Standing (or Challenge) Exam
Pass Exam or Transfer
High School Tech Prep Graduates
Entering Adult Students Without Tech Prep In High School
Employed Adults Who Desire to Upgrade Technical Skills


TECH PREP
TECH PREP FOR ADULTS
TRANSFORMATIONS
• DISLOCATED WORKER RETRAINING
• INDUSTRIAL TRAINING/ RETRAINING
• BRIDGE PROGRAMS TO AAS
TECH PREP FOR H. S. STUDENTS
TECH PREP/ASSOCIATE DEGREE (TPAD)
• H.S./POST-SEC. TPAD PROGRAMS
TRANSFORMATIONS CONSORTIUM
TRANSFORMATIONS CONSULTING
TECH CORE INSTRUCTIONAL MATERIALS
TECH SPECIALTY INSTRUCTIONAL MATERIALS
NATIONAL TECH PREP NETWORK
TPAD CONSULTING
TECH CORE INSTRUCTIONAL MATERIALS
TECH SPECIALTY INSTRUCTIONAL MATERIALS
TECH PREP PROGRAMS ARE SUPPORTED BY THESE RESOURCES
APPLIED ACADEMICS

Transformations

The "Bridge" Program for Adults Entering Advanced Skills Training

PRE TECH			TECH CORE	
PERSONAL COMPUTERS 2 Hr/Day 15 Days 30 Hr	GRAPHICS FOR TECHNICIANS 2 Hr/Day 15 Days 30 Hr	MECHANICAL DEVICES AND SYSTEMS 2 Hr/Day 10 Days 20 Hr	ELECTRICITY/ELECTRONICS 2 Hr/Day 30 Days 60 Hr	
APPLIED COMMUNICATION 1 Hr/Day 40 Days 40 Hr			PRINCIPLES OF QUALITY CONTROL 1 Hr/Day 30 Days 30 Hr	
Break 1 Hr			Break 1 Hr	
SELF-STUDY 1 Hr			SELF-STUDY 1 Hr	
APPLIED MATHEMATICS 3 Hr/Day 20 Days 60 Hr	PRINCIPLES OF TECHNOLOGY I 3 Hr/Day 20 Days 60 Hr		PRINCIPLES OF TECHNOLOGY II 3 Hr/Day 20 Days 60 Hr	FUNDAMENTALS OF FLUID POWER 3 Hr/Day 10 Days 30 Hr

Equivalent content to H.S. Tech Prep courses

or

TECH SPECIALTY
160 Hr
4 weeks

→ Entry Level Technical Job $5-7/Hr

ADVANCED SKILLS AAS PROGRAM
2 years, full time

→ Technical Career $10-15/Hr (Beginning)

IMPLEMENTATION CONSIDERATIONS

Essential Elements of the *Transformations* Program

Advisory Committee

- Representatives of a diverse cross section of business and industry
- Affirms the need for a technology literate workforce
- Identifies Tech Specialty curriculum
- Helps identify potential employment opportunities for *Transformations* students
- Helps identify local organizations that should be made aware of the *Transformations* program
- Helps promote the *Transformations* program among other employers

Student Selection

- Must have 8th grade reading and math abilities
- Have an interest in technology
- Indicate commitment to completing the *Transformations* program
- Have financial resources that will support them while they participate in the training
- Should be experienced workers
- Gender, age, ethnic heritage, etc. are non-issues

Quality of Training

- **Must prepare workers to reenter the workforce in a variety of entry-level positions**

- **Must prepare workers to successfully participate in employer-sponsored training programs related to a specific job or occupation**

- **Should be rigorous and comprehensive**

- **Must be achievable by the target student population**

Avoidance of Labor Market Oversaturation with Workers Trained in a Specific Tech Specialty

- Monitor demand occupations

- Alternate Tech Specialty training options

Transformations Implementation

Cost Estimate

Course	Hardware	Reusable Materials	Consumables
Personal Computers	* $40,500	$10	$200
Applied Communications		$210	$500
Graphics for Technicians	* $43,800	$600	$750
Mechanical Devices and Systems	$7,500	$15	$600
Applied Mathematics	$7,500	$210	$900
Principles of Technology	** $38,000	$80	$770
Electricity/Electronics	** $30,000	$20	$900
Fluid Power	$25,000	$20	$700
Introduction to Quality Control	$15,000	$20	$900
	$207,300	$1,505	$6,220

* Includes duplication of computers $40,000
** Includes duplication of electronic instrumentation $12,600

CORD's experience is that equipment cost to implement Transformations at schools is $120,000. Teacher's guides, videos, etc. are approximately $1,500 and consumables are $6,200/ session.

Student Support Services

- Tutoring
- "Approval" of *Transformations* program by local provider of state-operated employment services
- Family support
- Monetary support
- Peer support

Program Staff

- Should have work experience relevant to the course they teach
- Should have care and concern for the well-being of the students
- Need to be available for assisting students outside of structured class time
- Should be given an orientation to the *Transformations* program to enhance their understanding of the curriculum package and how their course fits into the big picture
- Should be given an orientation to the course materials they will be using
- Should attend Advisory Committee meetings
- Should have normal teaching responsibilities adjusted to accommodate *Transformations* training

Job-Search Assistance Activities

- Formal training
- Resume development
- Jobs-club
- Direct employer contact (promotion of *Transformations* training to employers)
- Research newspaper employment ads
- Individual counseling and assistance
- Media coverage

Sequencing Curriculum Offerings

- Complete the first offering of the *Transformations* program before implementing a second.

- When conducting two or more overlapping cycles of the *Transformations* program, the cycles should be phased 4 to 8 weeks apart.

- Avoid returning large numbers (25 +) of students to the labor market at one time.